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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/075,106	02/13/2002	John Robert Smith	H-204604	6949

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CARY W. BROOKS
General Motors Corporation
Legal Staff, Mail Code 482-C23-B21
P.O. Box 300
Detroit, MI 48265-3000

EXAMINER
BAREFORD, KATHERINE A

ART UNIT	PAPER NUMBER
1762	11

DATE MAILED: 05/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/075,106	Applicant(s) SMITH ET AL.	
	Examiner Katherine A. Bareford	Art Unit 1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 April 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892) 4) ☒ Interview Summary (PTO-413) Paper No(s). 11 Attached

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ . 6) ☐ Other:

DETAILED ACTION

Drawings

1. The amendment of April 24, 2003 has been received and entered. The compliant portions of the amendment of March 28, 2003 have also been entered.

Claim Rejections - 35 USC § 112

2. The rejection of claims 1-9 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention have been withdrawn in view of applicant's removal of the term "light metal".

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-14 are provisionally rejected under 35 U.S.C. 103(a) as being obvious over copending Application No. 10/022,322 which has common inventors (Larry Byrnes and Martin Kramer) with the instant application in view of Rabiei et al ("Microstructure, Deformation and Cracking Characteristics of Thermal Spray Ferrous Coatings" Article) (hereinafter Rabiei et al).

Based upon the earlier effective U.S. filing date of the copending application, it would constitute prior art under 35 U.S.C. 102(e) if published or patented. This provisional rejection under 35 U.S.C. 103(a) is based upon a presumption of future publication or patenting of the conflicting application.

'322 teaches the method of thermally spray coating a cylinder wall of a metal engine block by advancing a feed wire of a ferrous based material into an HVOF device, supplying a high velocity jet flow of gaseous fuel to the high temperature zone of the HVOF device, supplying a high velocity jet flow of oxygen to the high temperature zone of the HVOF device, combusting the oxygen and fuel to generate sufficient heat in the high temperature zone to melt the tip end of the feed wire in the high temperature zone and spraying the molten feed wire material onto the cylinder wall surface of the engine block to form a ferrous based coating thereon, and controlling the flow of oxygen relative to the flow of gaseous fuel to provide an oversupply of oxygen in excess of the oxygen required for stoichiometric combustion of the gaseous fuel, and reacting the excess oxygen with an associated fraction of the wire feed material in the high temperature zone to combust the associated fraction of the wire feed material as a source of solid fuel to provide a supplemental source of heat to the high temperature zone of the HVOF device, and where the amount of oversupply of oxygen is sufficient to increase the deposition rate of the molten metal on the cylinder wall by more than twofold than that deposited when oxygen is supplied at the level required for stoichiometric combustion of the gaseous fuel. See claim 1 of '322. claim 2 of '322 corresponds to claim 2 of the present application. Claim 5 of '322 corresponds to claim 3 of the present application. Claims 7-9 of '322 correspond to claims 4-6 of the present application. Claims 12-13 of '322 provides the teachings of claims 10-11 of the present application.

Claims 14-15 of '322 provides the teachings of claims 12-13 of the present application. Claims 14-15 of '322 also provide the fuel requirements of claim 14.

'322 teaches all the features of these claims except the additive material of yttrium, calcium, magnesium, titanium, zirconium, hafnium, cerium, or lanthanum (claims 1, 14) and its amounts and actions (claims 7-9).

However, Rabiei et al provides a study of HVOF sprayed ferrous based coatings. See the Abstract. Rabiei et al teaches that ferrous based coatings are commonly used as protective bore coatings on aluminum alloy cylinder blocks, where the ferrous based material in the form of a wire is thermally sprayed onto the bore surface. See page152. The resultant coating is a composite of the alloy with oxides resulting from oxidation during deposition. See page 152. Rabiei analyzed a variety of such coatings. See page 155 and Table 1 (page 153). As shown by Table 1 and page 155, the materials are predominately Fe with small amounts of other materials, including various amounts of aluminum and various amounts of oxides. For example, 2.1 or 2.6 wt % aluminum can be present. Furthermore, ranges of 0.9 to 12 wt% oxides (of Fe and/or Al) can be present. See Table 1 and page 155. Also, magnesium can be present in an amount between 1.05 wt% and 0.01 wt %. Table 1. As well, silicon can be provided in small amounts. Table 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify 10/022,322 to provide magnesium amounts as suggested by Rabiei et al with an expectation of forming a desirable coating, because 10/022,322 teaches HVOF spraying ferrous based materials (with an aluminum component) onto cylinder bores with a controlled oversupply of oxygen so as to form a desirable supplemental source of heat through reaction with the wire, and Rabiei

et al teaches that a desirable ferrous based coating material for HVOF spraying cylinder bores can be formed so that the resulting coating also has aluminum and/or magnesium and/or aluminum/iron oxides. For instance, Rabiei et al teaches that magnesium can be present in amounts of less than 1 wt % (see Table 1). As to the reaction of the additive material with impurities in the coating/sulfur, it would have been obvious that such a reaction would occur as a matter of course, given that the references provide the claimed materials, oxygen and high temperatures of HVOF processes.

This provisional rejection might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the copending application was derived from the inventor of this application and is thus not the invention "by another," or by a showing of a date of invention for the instant application prior to the effective U.S. filing date of the copending application under 37 CFR 1.131. For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

5. Claims 1-14 are rejected under 35 U.S.C. 103(a) by way of 102(f) as being unpatentable, because applicant did not invent the claimed subject matter. As discussed in the provisional rejection above, all of the features of the invention are provided by 10/022,322 and Rabiei et al.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted state of the prior art in view of Grylls et al (US 6485792), Lindblom (US 4687678), Rabiei et al ("Microstructure, Deformation and Cracking Characteristics of Thermal Spray Ferrous Coatings" Article) (hereinafter Rabiei et al) and Baranovski et al (US 6245390).

The admitted state of the prior art, at page 1 of the specification (see paragraph [0002]), teaches that it is known in the art to thermally spray coating onto a cylinder wall of an aluminum (light metal) engine block. A high velocity oxygen-fuel (HVOF) device is used. A jet of oxygen and gaseous fuel is ignited within an HVOF gun to melt a feed wire of ferrous-based material which is expelled from the gun by the jet of burning oxygen-fuel onto the surface of the cylinder wall.

The admitted state of the prior art teaches all the features of these claims except (1) the controlled oversupply of oxygen that reacts with the wire feed material to provide a supplemental source of heat (claim 1), (2) the additive material (claim 1), (3) the methane/propane fuel.

However, Grylls teaches a thermal spraying process that uses an HVOF spraying process. See column 7, lines 10-35 and column 8,line 55 through column 9, line 10. Grylls teaches that conventionally HVOF spraying processes occur with an excess of oxygen, which provides the hottest flame. See column 7, lines 10-35. However, this excess of oxygen can result in oxidation of the particles that form the coating. See column 7, lines 10-35.

Lindblom teaches thermal spraying a ferrous-based material (Fe Cr Al Y, for example). Column 1, lines 45-65 and column 2, lines 40-60. The coating can be improved by the deliberate formation of oxides in the coating material during thermal spraying. Column 1,lines

45-55. In this case, when plasma spraying, a controlled content of metal oxide in the coating can be varied by having more or less oxygen gas in the plasma. See column 2, lines 40-55. The coating material can contain the additive materials of aluminum and yttrium. See column 2, lines 40-60.

Rabiei et al provides a study of HVOF sprayed ferrous based coatings. See the Abstract. Rabiei et al teaches that ferrous based coatings are commonly used as protective bore coatings on aluminum alloy cylinder blocks, where the ferrous based material in the form of a wire is thermally sprayed onto the bore surface. See page152. The resultant coating is a composite of the alloy with oxides resulting from oxidation during deposition. See page 152. Rabiei analyzed a variety of such coatings. See page 155 and Table 1 (page 153). As shown by Table 1 and page 155, the materials are predominately Fe with small amounts of other materials, including various amounts of aluminum and various amounts of oxides. For example, 2.1 or 2.6 wt % aluminum can be present. Furthermore, ranges of 0.9 to 12 wt% oxides (of Fe and/or Al) can be present. See Table 1 and page 155. Also, magnesium can be present in an amount between 1.05 wt% and 0.01 wt %. Table 1. As well, silicon can be provided in small amounts. Table 1.

Baranovski teaches that when performing HVOF spraying, the fuel can conventionally be a gaseous propane, methane, hydrogen or other gases. See column 1, lines 20-50.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the admitted state of the prior art to provide a controlled oversupply of oxygen that reacts with the wire feed material to provide a supplemental source of heat as suggested by Grylls and Lindblom with an expectation of forming a desirable coating, because the admitted

state of the prior art teaches that it is known to HVOF spray ferrous based coating materials onto a cylinder wall of a light metal engine block and Grylls teaches that when HVOF spraying it is conventionally known to provide an excess of oxygen that reacts with the feed material to form oxides, and Lindblom teaches that when thermal spraying a ferrous based material it is desirable to provide a controlled amount of oxygen to the material so as to form a desired amount of oxides in the resulting coating from when the oxygen reacts with the ferrous based material. As a result of these teachings, it would be suggested to provide a controlled excess amount of oxygen in the HOVF spraying of the admitted state of the prior art, so as to provide a beneficial ferrous based coating with a controlled amount of oxides. As a result of providing the controlled amount of excess oxygen, which reacts with the feed material to form oxides, this would provide the claimed combustion and resulting supplemental source of heat as claimed. As to the exact amount of oversupply of oxygen needed for optimum coating results, this would be a matter of routine experimentation, since Lindblom teaches the varying of the amount of oxygen to provide the desired amount of oxides. It would further have been obvious to one of ordinary skill in the art at the time the invention was made to modify the admitted state of the prior art in view of Grylls and Lindblom to provide magnesium and aluminum amounts and oxides as suggested by Rabiei et al with an expectation of forming a desirable coating, because the admitted state of the prior art in view of Grylls and Lindblom suggests HVOF spraying ferrous based materials onto cylinder bores with a controlled oversupply of oxygen so as to form a desirable amount of oxides in the resulting coating, and Rabiei et al teaches that a desirable ferrous based coating material for HVOF spraying cylinder bores can be formed so that the resulting coating has aluminum and/or

magnesium and/or aluminum/iron oxides. For instance, Rabiei et al teaches that a desirable amount of aluminum can be 2.1 wt % (see material D) (reading on the amounts claimed in claims 4-5). Rabiei et al also teaches that when aluminum is present oxides of Fe and/or Al are formed, which would suggest the formation of $FeAl_2O_4$, since the reaction between oxygen, iron and aluminum would occur. It further would have been obvious to modify the admitted state of the prior art in view of Grylls, Lindblom and Rabiei to use methane or propane as the fuel as suggested by Baranovski in order to provide a desirable coating, because the admitted state of the prior art in view of Grylls, Lindblom and Rabiei suggest an HVOF spraying process, and Baranovski teaches that methane and propane are common desirably used fuels for HVOF spraying processes.

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1-14 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 and 5-10 of copending Application No. 10/022,322 in view of Rabiei et al.

The claims of 10/022,322 provide all the features of the above claims of the present application, such as the ferrous based wire and the HVOF spraying onto the cylinder block with an excess of oxygen, except for the additive material and their related effects/amounts (note the discussion in the provisional 35 USC 103 rejection above).

However, Rabiei et al, as discussed in the 35 USC 103 rejection above, provides a study of HVOF sprayed ferrous based coatings. See the Abstract. Rabiei et al teaches that ferrous based coatings are commonly used as protective bore coatings on aluminum alloy cylinder blocks, where the ferrous based material in the form of a wire is thermally sprayed onto the bore surface. See page152. The resultant coating is a composite of the alloy with oxides resulting from oxidation during deposition. See page 152. Rabiei analyzed a variety of such coatings. See page 155 and Table 1 (page 153). As shown by Table 1 and page 155, the materials are predominately Fe with small amounts of other materials, including various amounts of aluminum and various amounts of oxides. For example, 2.1 or 2.6 wt % aluminum can be present. Furthermore, ranges of 0.9 to 12 wt% oxides (of Fe and/or Al) can be present. See Table 1 and page 155. Also, magnesium can be present in an amount between 1.05 wt% and 0.01 wt %. Table 1. As well, silicon can be provided in small amounts. Table 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify 10/022,322 to provide magnesium amounts as suggested by Rabiei et al with an

expectation of forming a desirable coating, because10/022,322 teaches HVOF spraying ferrous based materials (with an aluminum component) onto cylinder bores with a controlled oversupply of oxygen so as to form a desirable supplemental source of heat through reaction with the wire, and Rabiei et al teaches that a desirable ferrous based coating material for HVOF spraying cylinder bores can be formed so that the resulting coating also has aluminum and/or magnesium and/or aluminum/iron oxides. For instance, Rabiei et al teaches that magnesium can be present in amounts of less than 1 wt % (see Table 1). As to the reaction of the additive material with impurities in the coating/sulfur, it would have been obvious that such a reaction would occur as a matter of course, given that the references provide the claimed materials, oxygen and high temperatures of HVOF processes.

This is a provisional obviousness-type double patenting rejection.

Response to Arguments

9. Applicant's arguments filed April 24, 2003 have been fully considered but they are not persuasive.

As to the arguments as to the 35 USC 103 rejection of claims 1-9 using the admitted state of the prior art in view of Grylls, Lindblom and Rabiei, the Examiner has withdrawn this rejection due to the amendments to the claims as to the increase in the deposition rate.

As to the arguments as to new claim 14, the Examiner has added the reference to Baranovski to the rejection of the admitted state of the prior art in view of Grylls, Lindblom and

Rabiei, to indicate the desirability of using methane or propane gaseous fuel in an HVOF spraying process.

As to the arguments as to the double patenting rejection of claims 1-9 (now 1-14), applicant argues that the two applications are not obvious in view of each other, and that there is no suggestion in the prior art to add or subtract components to arrive at the claims of the other application, or that a person of ordinary skill in the art would have had a reasonable expectation of success despite the unpredictability of the art. Applicant further argues that there is no suggestion that the oversupply of oxygen could be sufficient to increase the deposition rate of the molten metal on the cylinder wall by more than twofold with or without the additional components of the claims in the corresponding cases. The Examiner has reviewed these arguments, however, the double patenting rejection is maintained. The teaching that the oversupply of oxygen could be sufficient to increase the deposition rate of the molten metal on the cylinder wall by more than twofold is specifically found in the claims of both applications, including 10/022,322 ('322). '322 further claims a "ferrous-based material" in general and provides that additives of aluminum can be made. Thus, '322 itself provides open-ended wording in the claims that would allow for additives other than iron to be in the spraying material. As to the specific spraying additives, the Examiner has provided Rabiei, for example, to indicate that one of ordinary skill in the art would provide additives when HVOF spraying ferrous based coatings on cylinder bores and expect desirable results when doing so.

The Examiner has further provided a provisional 35 USC 103 rejection of the claims using 10/022,322 (see the rejection above) given that '322 and the present application are not identically assigned.

The Examiner has further provided a 35 USC 103 (by way of 102(f)) rejection of the claims given the teachings of '322 and the fact that '322 and the present application are not identically assigned.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (703) 308-0078. The examiner can normally be reached on M-F(7:00-4:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

KATHERINE A. BAREFORD
PRIMARY EXAMINER
GROUP 1100/700